very similar list of Muneypoor and Naga Hill plants (given in Journ. Linn. Soc., vol. xxv.) there are 924 Phænogams in 503 genera—*i.e.* a proportion of about 1·8 species to a genus. In this case the total flora would amount perhaps to 5000 species.

Mr. Hemsley concludes:—"The most interesting point, perhaps, connected with this collection has been left to the last. It is the large number of temperate types it contains from comparatively low elevations. Sir Joseph Hooker ("Himalayan Journ.," vol. ii. [ed. i.] p. 281) observed the same thing in the investigation of the Khasi Hills." This is a very curious point. Mr. Hemsley suggests that in the Shan Hills the comparatively small rainfall may have had much to do with it. But, near Cherra Poonjee, where Sir Joseph Hooker observed the fact, the annual rainfall varies from 400 to 650 inches. In both the Khasi and the Shan Hills the plateaus were probably once largely covered by jungle which has been (except patches) destroyed, while the district is kept in open grass (or small shrubs) by setting the grass on fire at the commencement of each cold season. In this way a large number of the temperate genera cited by Mr. Hemsley (Anemone, Delphinium, Silene, Stellaria, Hypericum, &c.) obtain a suitable habitat, which is denied them in the dense forest of the Eastern Himalaya at the same elevation (4000-7000 feet). But this is no adequate explanation. *Pinus longifolia*, which ascends to 7500 feet in the North-Western Himalaya, is rare above 3000 feet in Sikkim, and grows very fairly in the Bengal plain at Dacca. The Khasi pine, which grows mainly in the Khasi Hills at about 5000 feet altitude, descends nearly to sea-level in more tropical areas. And there are many such cases. The paper is put through the press by Mr. Hemsley with his usual literary finish. He might be asked why he prints *Physostelma carnosa* and *Brachystelma edulis*. He might reply that, according to "Propria quæ maribus," the names of all plants are female. Granting that, then why does Mr. Hemsley, who insists on uniformity from other botanic writers, write *Hypericum pachyphyllum?*

The present paper is produced by General Collett and the Linnean Society at their own private costs and charges. It would be a mistake to infer, therefore, that it is inferior in botanic merit to Aitchison's "Botany of the Afghan Delimitation Commission" or to Ridley's "Botany of Fernando Noronha"; and it has the additional value to Government that it deals with a territory (before unexplored) on its annexation to the English Crown. The thanks of all systematic, geographic, and economic botanists will be gratefully accorded to General Collett for his very valuable contribution to knowledge.

THE METHOD OF POLITICAL ECONOMY.

The Scope and Method of Political Economy. By John Neville Keynes, M.A. (London: Macmillan and Co., 1891.)

MR. KEYNES is known to the philosophical world as the author of what is in some respects the best treatise on a subject which has occupied the acutest intellects for above two thousand years—to wit, formal logic. Cultivated by so many skilful hands, that little branch of science might seem to have produced all the fruit of which it was capable. Yet it has been at least trimmed and pruned by Mr. Keynes not inelegantly. Nay, more; climbing up to that part where growth is still going on, he has gathered new fruits, or at leas brought down to earth those which had been before very difficult of attainment. We allude to the arduous and thorny problems of symbolic logic, which Mr. Keynes, in the work referred to, has translated into the language of ordinary life and common-sense.

Mr. Keynes's second claim to distinction is curiously similar to his first. His present subject has not, indeed, the venerable antiquity of formal logic. Yet the material logic of political economy has also occupied treatises which are already classical. Mill, the Aristotle of the subject, opened and almost exhausted it.

> "Quo nihil majus generatur ipso,
> Nec viget quidquam simile aut secundum;"

even if we concede to Mr. Keynes that Mill required to be corrected by himself: that the "Unsettled Questions" lag behind the "Political Economy." The general principles propounded by Mill appear to have been accepted by an influential majority of his successors; not excepting many names which are usually associated with the exclusively historical school. The remarks of Cohn, Roscher, and Wagner, which Mr. Keynes cites, are substantially in accord with Mill's. We say, substantially; for the phrase and emphasis have varied with the individuality of each writer, and the particular variety of heresy which he has had occasion to controvert.

Reviewing a long controversy, Mr. Keynes draws up, as it were, a confession of faith, so comprehensive and tolerant that, as it seems to us, only fanatics can find difficulty in subscribing to it.

The cardinal article is, of course, that which defines the relation between abstract reasoning and specific experience. Mr. Keynes holds the balance impartially between the *a priorists* and the historical school. He reasserts in modern words Mill's doctrine that "either acquirement without the other leaves one lame and impotent." In Prof. Cohn's words, cited by Mr. Keynes, "all induction is blind, so long as the deduction of causal connections is left out of account; and all deduction is barren, so long as it does not start from observation."

On the one hand, Mr. Keynes insists that all deductive reasoning rests on "hypotheses"; which do not indeed rest upon nothing, yet are seldom sufficient to support a practical conclusion. The person who confines himself to abstract reasoning must be content, as Mill says, to "have no opinion, or to hold it with extreme modesty, on the applications which should be made of his doctrines to existing circumstances." Mr. Keynes has no leaning towards the dogmatists who deduce *laisser faire* or any other practical rule from abstract notions. He deals another blow to, he speeds upon their road to extinction, those whom Dr. Sidgwick has described as "a scanty and dwindling handful of doctrinaires whom the progress of economic science has left stranded on the crude generalizations of an earlier period."

On the other hand, Mr. Keynes does not exaggerate the importance of experience and observation. He points out the uses of history in illustrating, criticizing

©1891 Nature Publishing Group

and establishing economic theory. But at the same time he exposes the utter inadequacy of a merely inductive method to deal with the complex phenomena of industry and commerce. He quotes approvingly Bagehot: "If you attempt to solve such problems without some apparatus of method, you are as sure to fail as if you try to take a modern military fortress—a Metz or a Belfort—by common assault." Addressing extreme representatives of the exclusively historical school, Mr. Keynes condemns them out of their own mouth. Owing to that shifting character of economic conditions upon which they are always insisting, the study of the past becomes less applicable to the problems of the present day.

One difficulty in forming a judgment about the pretensions of the historical school is to know what they mean to assert beyond what every sensible person admits. "It is far from being easy," says Mr. Keynes, "to gain a clear idea of the form to be assumed by economics when its 'transformation' has been effected." His gentle reproof may be contrasted with the slashing sarcasm of a recent writer who applies to the historical school what has been said of the French, "that they don't know what they want, and will never be satisfied till they get it." Mr. Keynes, it must be admitted, is less incisive and epigrammatic than some preceding writers upon method. He is less entertaining to those who already agree with him; but perhaps he is more likely to convert those who differ from him.

The parallel which we have attempted to draw between the present and the earlier work of the author would not be complete if we did not point out that he has done more than merely consolidate the *dicta* of the earlier authorities. He has not only gone over the beaten road, mending it in places; but also, diverging into a comparatively fresh field, he has struck out a new path, or rather converted what was but a path into a highway. We allude to his remarkable chapter on symbolical and diagrammatic methods in political economy. Following upon Prof. Marshall's great work, in which these methods are so potently employed, Mr. Keynes's careful statement of their uses is likely to obtain general acceptance. Most of the previous writers who had taken much the same general view as to the functions of deductive reasoning had not considered that particular species of deduction which is effected through the channel of mathematical conceptions. Some eminent theorists were perhaps silent on this head from motives of discretion, knowing the hardness of readers' hearts. With others the cause may have been that which Dr. Johnson assigned for one of the mistakes in his dictionary, "Ignorance, madam, pure ignorance." Jevons, indeed, is a conspicuous exception. But his very zeal marred his advocacy. His personal connection with the cause impaired his authority. A plain man could hardly feel certain but that the new calculus was not a plaything like the "logical machine." Accordingly, when in the course of an impartial summing up of the claims of different schools, Mr. Keynes is far from condemning the mathematical method as trivial, his judicial utterances are likely to have a considerable effect. Very convincingly he dwells upon the appropriateness of mathematical symbols to represent the mutual dependence of variables and other leading conceptions of political economy. The peculiar genius of the economical calculus is thus seized:—

> "Functions, while remaining numerically unknown, may possess known properties; and on the assumption that certain general relations between quantities hold good, it may be possible mathematically to deduce further relations that could otherwise hardly have been determined."

Altogether, it is a matter for rejoicing that the task of connecting and supplementing all the authorities on all the methods has devolved upon one so widely read, so impartial and exact. On a subject which it is undesirable to be always reopening, it may be hoped that Mr. Keynes's work will prove final. It may be expected that his second logical treatise will enjoy the same popularity as his first; for it deserves the same rare encomium—that, if a reader is under the necessity of confining himself to a single book upon the subject, the single book had best be that of Mr. Keynes. F. Y. E.

OUR BOOK SHELF.

Mixed Metals, or Metallic Alloys. By A. H. Hiorns (London: Macmillan and Co., 1890.)

THIS is a useful little book, which will render good service to the craftsmen for whom it is evidently intended, and by whom such a work was much needed, for, with the exception of the translation of Guettier's "Guide Pratique des Alliages" and Brannt's "Metallic Alloys," there is no treatise on the subject, the information we possess being scattered through books and monographs which are difficult to obtain.

Mr. Hiorns begins with a reference to Gellert's "Metallurgic Chemistry," but he can hardly be familiar with even the English edition of Gellert's work published in 1776; he would have refrained from adopting the title of "Mixed Metals" for his book if he had had Gellert's clear indications as to the solvent action of metals on each other to guide him, supported as they are by Matthiessen's later experimental evidence, which led him to define alloys as "solidified solutions." It is true that in many cases, when masses of fluid alloys solidify, certain groups of constituents "fall out" of solution, but there is no known instance of a pure metal separating from the mass with which it was united, and remaining simply mixed. It is to be regretted that, for the sake of employing a term well known in the "metal trades," artisans should have an erroneous suggestion as to the nature of alloys conveyed by the very title of a hand-book.

In dealing with the effects of elements on metals, the indications are not quite as definite as could be wished. For instance, it is stated that "much arsenic is highly injurious" to copper, "making the metal hard and brittle"; but what should be considered *much* arsenic in a case of this kind? If certain metals were melted with gold, the ten-thousandth part of the added matter would impair the ductility of the gold, and would render it impossible for the jeweller to use it; but as regards the case in point—the action of arsenic on copper—a "trace" of arsenic would greatly diminish the value of the copper for electrical purposes, nevertheless the presence of as much as 1 per cent. would not be injurious if the copper had to be used for the fire-boxes of locomotives.

The author contributes the results of some important experiments of his own in connection with the manufacture and use of alloys of copper, nickel, and zinc, known as German silver. The sections which relate to alloys of iron with other metals are well done, as are those in which phosphor-bronze is dealt with. What is needed

©1891 Nature Publishing Group